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ESCUELA POLITÉCNICA SUPERIOR Alicante University

Carretera San Vicente del Raspeig s/n 03690 San Vicente del Raspeig. Alicante (SPAIN)

eurau@ua.es

Syria: From Destruction to Reconstruction

Use of War Demolition Materials in Rural Housing Construction in Syria

Haj Ismail, Salah¹

1. LADICIM (Laboratory of Materials Science and Engineering), University of Cantabria. E.T.S. de Ingenieros de Caminos, Canales y Puertos, Santander, Spain, e-mail: salahhi@gmail.com

Synopsis

Seven years of destructive war in Syria caused huge damage in different sectors, the amount of waste materials came out of destruction clearly created a big problem to manage and solve in the post-war reconstruction era. This paper aims to suggest and investigate the future possibilities of using the destruction materials in housing building and reconstructing for internally displaced people and refugees willing to return to Syria.

The need of architectural innovative solutions, force a new mentality in construction materials science, reconstruction management and urban planning; since the project is suggesting to build housing modules in rural areas of northern Syria using materials from the rubble. This will achieve different goals, recycling the materials, because construction materials are rare and expensive, and manage cities reconstruction effectively, giving space to community healing.

An alternative approach proposed for a retroactive interaction with other disciplines for a holistic vision solution of the post war reconstruction in Syria.

Key words: Reconstruction, waste materials, rural, planning, Syria.

1. Introduction

The debate about post-war reconstruction has been ongoing during the last seven years of the continuous Syrian war. The increasing volume of destruction in different big cities has created a need for new ideas and innovative building solutions. Many studies have tried to suggest solutions comparing other countries ruined by wars. The case studies have considered similarities and differences demanding innovative ideas and non-traditional solutions for the reconstruction of large Syrian cities such as Aleppo and Homs.

Rural communities in Syria were always presented as self-sufficient societies, economically, demographically, socially and even culturally. However, rural areas have had poor regional planning. Development efforts have concentrated upon urban areas. The dramatic gap of available services between rural and urban areas released a wave of migration to cities. The number of inhabitants in rural areas has decreased by 17% from 1960 to 2010 [2].

Due to the war in Syria, the direction of migration has alternated for many reasons. The main reasons for migration to rural centres are due to the relative safety of rural areas and the less damaged infrastructure compared to the destruction in the cities. People originating from the rural areas surrounding the cities have also returned to their home villages and towns due to losing their city jobs and have also found the possibility to work in agriculture to secure their minimum needs for living, i.e. water, energy and food[17].

For example, a village such as Dabiq in Northern Syria has grown from a population of 4,800 inhabitants in 2011 to 8,945 in 2015. With the liberation of the village from the control of ISIS, the population has increased as refugees return from Turkey and other areas in Syria and has reached a total population of 12,568 in January 2017. Syrians are similarly returning to the 1,476 villages and 1,312 farms in the areas that have intact infrastructures and services in good condition. The number of migrating people to the rural areas is even causing a housing problem.

This project proposes to provide transitional housing in rural areas for the returning Syrians to answer the above defined housing need in the rural areas, and also to align with the United Nations 2030 Agenda for Sustainable Development for rural development as outlined in Agenda points 24 and 34, as well as Goals 2a and 11a [16]. Assuming that approximately 20% of the Syrian exiles from the Aleppo region currently residing in Turkey would like to return to Syria and do not have a residence, if evenly distributed, 70 people will need new houses in each rural centre meaning that eight to ten houses will be required per rural centre.

The difficulty to import and transport building materials into the region favours the use of locally available materials and traditional construction and building techniques. The design concept is to integrate the local rural vernacular architecture of Northern Syria for transitional housing while considering the contemporary needs of the new and previous residents of the rural centres. To achieve this goal, the project studies, analyses, and experiments with different possible design concepts based upon the local adobe building tradition. The design solution will integrate an easy to construct building concept as an alternative to

tents camps, “which often are militarized in the sense that fighters are recruited among the refugees by insurgents, which may even transform refugee camps into training camps and bases for rebel groups” [13].

2. Related work

Two fundamental approaches for reconstruction have been adopted in the literature: “technology-based approach” and “community-based approach”. While technology-based approaches using housing imports from developed countries, the community-based approach is based on the principle of taking advantage of local resources in reconstruction process[8].

As a response to the major 2010 earthquake in Haiti, Konbit Shelter has been rebuilding housing using “Super-Adobe” construction, a design developed by Nader Khalili and Cal-Earth. Fig 1.[3]



Figure 1. Completed "Konbit Shelter" house in Haiti(left) ,Baninajar Refugee Camp Emergency Shelter, Khuzestan, Iran © CalEarth(right).

Fourteen disaster relief shelters for the Baninajar Refugee Camp in Khuzestan, Iran were commissioned from CalEarth in 1995 as an initiative of the United Nations Development Program (UNDP) Tehran, in cooperation with the United Nations High Commissioner for Refugees (UNHCR) Tehran. The structures are visible in Fig 1. It is assumed that the structures have been destroyed after the dismantlement of the camp.[4]

“Better Shelter”, Ikea Foundation’s flat-packed refugee shelter project together with the UNHCR designed to last up to three years. The shelters are an alternative to tents and are designed as temporary shelter, Fig 2. [9,10].



Figure 2. Ikea Foundation’s © “Better Shelter” (left), “Hex House” by © Architects For Society P.S.C(right).

Hex House by Architects for Society is a modular housing unit composed of galvanized steel and insulated metal panels. Similar to the Better Shelter, the housing units are to be shipped for assembly on site.

None of the above projects has proposed a new design based upon an existing regional building tradition. Only Konbit Shelter has utilized local vernacular elements. Half of the projects propose self-assemblable housing kits with fully imported materials. The others use earth tubes with local soil for building material.

3. Learning from Syrian rural housing tradition

The typology of rural houses in Syria is classified in four main types: [6]

3.1. The basic house

This is the most elementary typology, Fig 3.

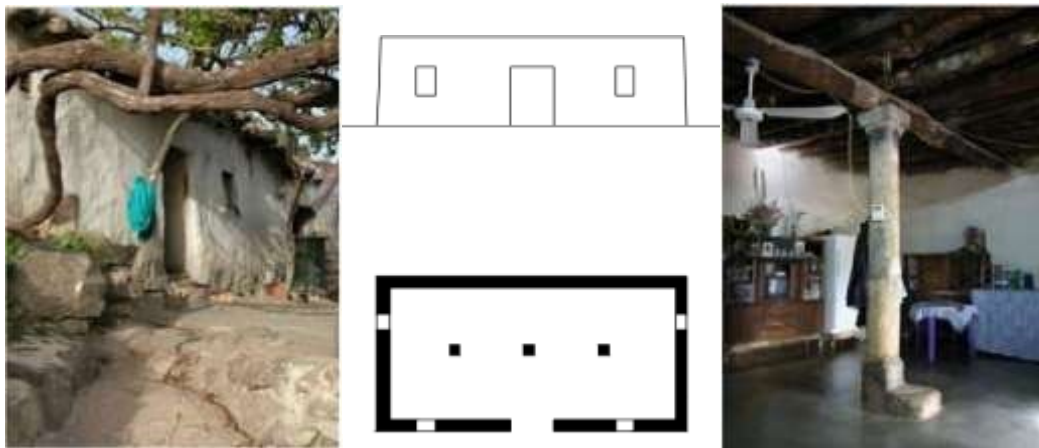


Figure 3. Basic rural Syrian house: exterior view (left), plan and elevation (center), and interior view (right).
Source: CORPUS Project.

3.2. The house with a porch

Riwaq: This house is developed upon the basic house by adding an arcade gallery. Fig 4.

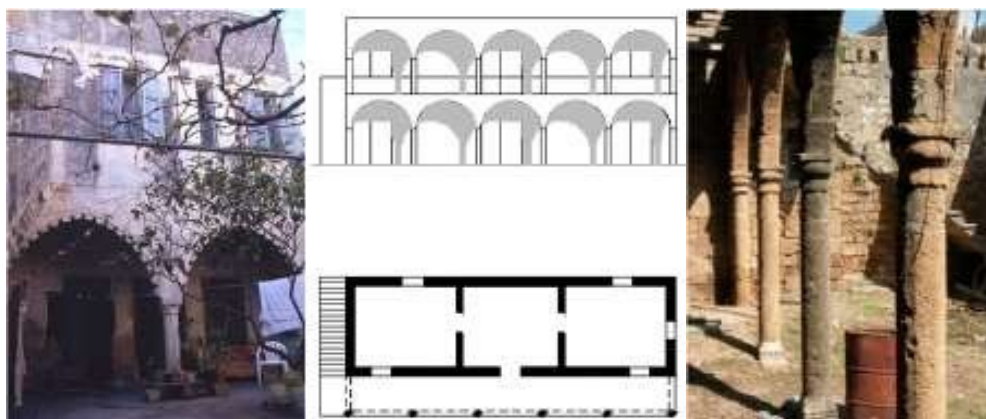


Figure 4. Rural house with Riwaq: exterior view (left), plan and elevation (center), and view from the Riwaq (right). Source: CORPUS Project.

3.3. House with an Iwan

The Iwan is a central space formed by a very large arch., Fig 5.

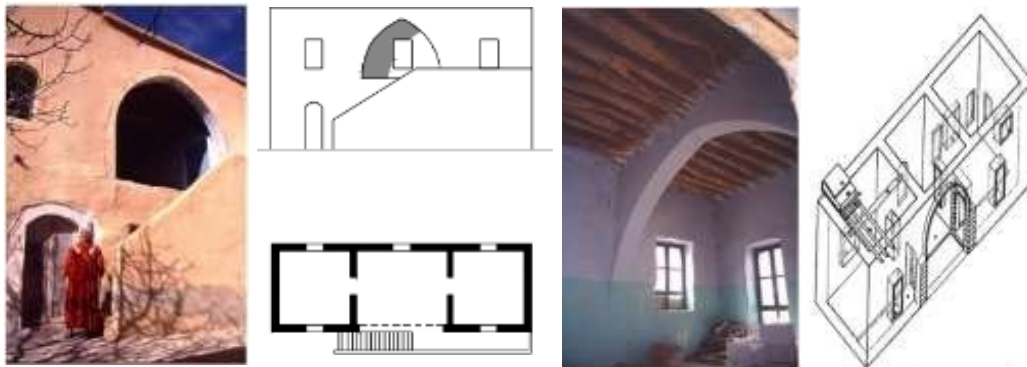


Figure 5. Rural house with Iwan: exterior view (left), plan, elevation and 3D section (center), and interior (right). Source: CORPUS Project.

3.4. House with a courtyard

This house is characterized by a layout of rooms built around a courtyard.

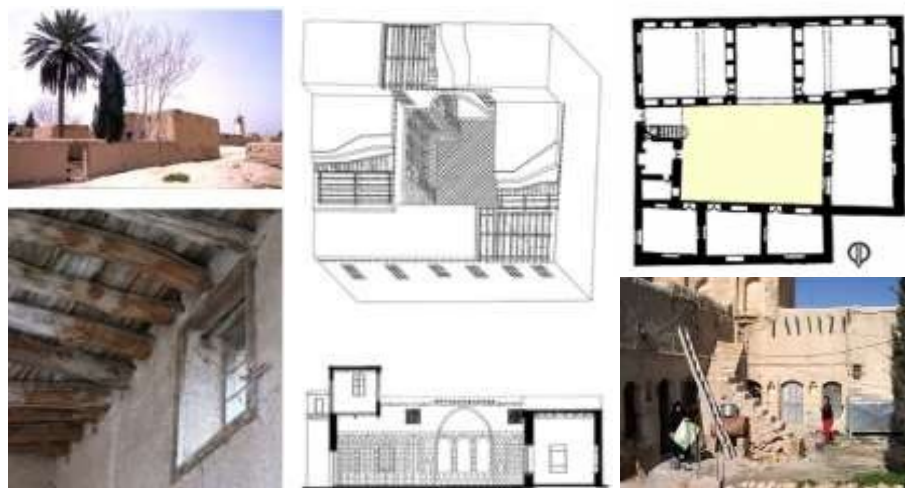


Figure 6. Rural house with courtyard: exterior view (top left), plan (bottom right), interior courtyard (bottom left), bird's eye view (top right), and cross-section (). Source: CORPUS Project.

4. Design concept for rural houses in northern Syria

An alternative design concept is being developed using the beehive house as a basis that is dependent mostly on the availability of local material that is adapted to the environment. The design incorporates the utmost respect of the modern users needs and the modules can be built with minimal construction knowledge. The building plan has a simple rectangular form of approximately 4 x 4 m. The wall structure will be supported by a wood construction in order to reinforce the building against earthquakes instead of only being composed of adobe bricks as is built in conventional housing. The main building material will be earth mixed with water and straw. The composition may differ using dung, sand, silt, clay, small pieces of gravel, or even recycled rubble from destroyed buildings. A recip- rocal structure will be employed for the roof, since it allows

larger spaces to be built with smaller dimensioned building elements. Therefore, there will be locally available and appropriate building materials reducing the need to import prefabricated elements and/or nonnative construction materials. The use of smaller timber members will make transportation of the roof material easier.

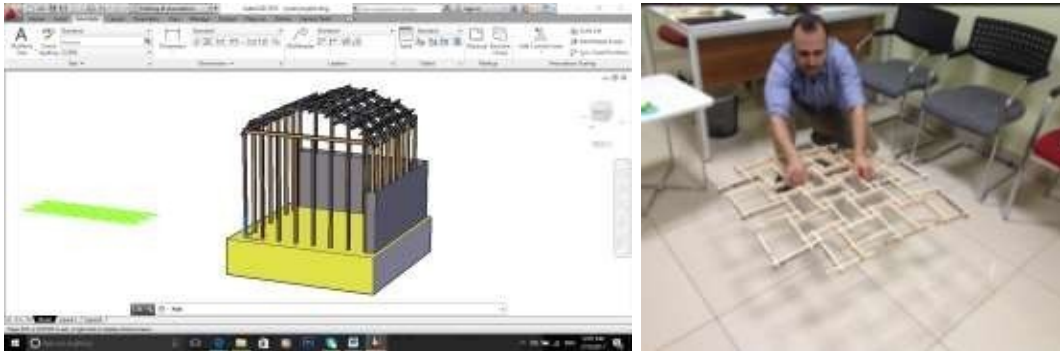


Figure 7. 3D concept model (left), scaled roof test model (right). Source: Author's own photos.

5. Conclusions and Future Work

Developing the beehive clay houses to use local and recycled materials from destroyed buildings is a solution to overcome the scarcity of building material and construction machinery. It also helps to solve the problem of clearing war-produced waste materials in the long-term. Aleppo was destroyed 14 times across history by wars or earthquakes, rural areas were the traditional refuge for those escaping from the city. This will clearly be repeated in the current Syrian war opening the possibility for rural communities to participate in social reconstruction efforts.

The new single-family houses in Syrian villages will have the advantage of secured places with existing infrastructure systems and less war-damage. In a more integrated society with similar culture and traditions, an additional benefit of building houses in villages is that the settlers can benefit from the land in terms of agriculture and livestock, reestablishing their economic and social self-sufficiency. The modular design of the new homes will allow the occupants to enlarge their spaces depending upon their needs.

An investigation for the best design, for not only the residential needs, but also further analyses will be conducted during a future phase of the project focusing on the structural and seismic performance, energy performance, annual energy demand and cost-effectiveness. The design will be refined according to test outcomes, establishing guidelines for best practice during resettlement and construction periods.

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